

NOTES ON ASTENOPHYLAX ARGUS HARRIS. (TRICHOPTERA).¹

BY J. T. LLOYD,

ITHACA, N. Y.

During the hot days of August, when the streams of our fields and gorges are low and warm, if one goes to the alder-swamps to the north or south of Ithaca he will find clear, cool streams maintaining an abundant flow of water. In winter when our deeply frozen nearby streams do not break the snow-cover of adjacent fields, except where narrow dark lines carpeted with anchor ice mark the course of the swiftest riffles, the open waters of the swamp streams show as narrow lines of black contrasted to the snow cover of surrounding thickets. Only in the severest weather a film of ice forms across their most quiet regions and in protected bays along their banks. And when in spring, the snow melts and the freshets come, the surface-fed streams quickly rise to many times their normal volume, their muddy waters overflowing low banks and rushing in deep torrents through gorges, carrying sand and pebbles and grinding with large boulders, the swamp-streams flow quietly on, their clear waters hardly above their August levels and their bottoms of twigs and fragments of vegetable-matter undisturbed by torrents.

Springfed streams are these, whose water pours from the ground at the foot of nearby hills, or seeps from beds of sphagnum in neighboring bogs. Always clear and but slightly affected by changes of temperature or precipitation that completely alter conditions in lakes and rivers, their waters are as nearly uniform as is possible in our changing climate.

As might be expected under these uniform conditions, their inhabitants, unlike most creatures of more changeable streams, alter their habits but little during the seasons. In winter, as in summer, they crawl actively over the bottom, feeding and carrying on their usual activities. In both seasons the stomachs of the species we have examined have been equally gorged.

¹ Contribution from the Limnological Laboratory of the Department of Entomology in Cornell University.

In these alder-bordered streams of our upland swamps lives *Astenophylax argus*, one of the largest and, in the adult, most gaudily colored of all Trichoptera. Its larva and pupa are described in detail on the following pages and, as existing descriptions of the adults are apparently made from dried material, brief notes on their coloration in life are included.

Larval Habit.—The larval cases, Fig. 1, the largest and most bulky in our streams, are constructed of fragments of twigs and bark which vary greatly in size and shape. These fragments, arranged apparently with little regard for system or symmetry, are fastened securely together by means of silk and the tube thus formed is lined from end to end with a tough cylinder of silk. Clumsy and bulky as the larval cases are, they do not vary greatly from cylindrical form, nor do they have projecting twigs or corners that would catch during locomotion, nor chunks or stones that would be too heavy for the powerful larvae to drag. In the pupal cases, to be described later, heavy stones and great fragments of bark are used, whose weight and form would make locomotion almost impossible.

The food of the larva throughout the year consists of dead bark and wood rasped from submerged twigs and logs. Specimens collected in February contained the same kind of food as specimens collected in mid-summer, and at both seasons the alimentary tracts were equally gorged.

Pupal Habits.—By the middle of April the larvæ have ceased their activities and have gathered and attached to their cases bulky, heavy material, large pebbles, chunks of bark, the large species of Sphæriidæ, *Spharium simile*, or twigs, sometimes inhabited by the wood-boring Trichoptera of the genus *Ganonema*. These heavy cases are attached firmly by their cephalic ends to submerged logs, roots or other solid supports. At this time the sieve-nets, perforated sheets of silk across the tube, are spun. In *Astenophylax argus* these sieves are located within the tube a short distance from its caudal and cephalic ends. The mesh varies in size and form, but is roughly hexagonal.

DESCRIPTION OF ADULT, LARVA AND PUPA.

Adult.—♂ and ♀. Length of body 20 mm. Fore wing 25–26 mm. The color pattern and venation of the wings and the male genitalia are illustrated in figs. 2 and 3.

Head.—Brilliant yellow, except a jet black spot at the base of each ocellus. Eyes jet black. Antennæ dark, except basal joint, which is brilliant yellow.

Thorax.—Prothorax brilliant yellow. Thorax above black except a narrow U-shaped line bending to the base of the wings which follows the path of the meso-notal furrow, and the scutellum yellow. Under side of thorax straw color. Legs straw color with yellow coxæ. Wings marked with black and pale salmon; veins pale salmon.

Abdomen.—Straw color.

Larva.—Length of the mature larva is 40 mm. Its breadth at the third thoracic segment is 6 mm.

Head.—The head, except the mandibles which are black, is brown with inconspicuous darker markings which vary somewhat in intensity in different individuals but maintain the same general pattern for the species; the color-pattern and distribution of setæ on the dorsum are shown in Fig. 6; the under side of the head lacks markings except an area of small, somewhat oval, well-defined spots which project forward from its caudal margin on each side of the median line.

Thorax.—The color-pattern and distribution of setæ of the dorsum of the first and second segments are shown in Fig. 3; the under side is weakly chitinized, except for the median thorn on the first segment; the third segment above is weakly chitinized, except for a median glabrous spot near the cephalic margin, on each side of which there is a dark brown mark bearing five or six setæ; farther back and slightly more remote from the median line there is a triangular spot bearing about ten setæ; on each side of the segment there is an elongate glabrous area marked with several brown spots, the cephalic of which bears about a dozen setæ; the second and third thoracic segments bear numerous minute spines which, for the most part, point forward.

Legs.—Brown with darker markings along the edges and around the setæ.

Abdomen.—The first segment above has several circular brown spots surrounding setæ, a glabrous area borders the caudal margin of each lateral hump and a group of four or five fine setæ is present above and below each lateral hump; on the ventral side there are a few scattered setæ and a bilobed median mark containing four or five setæ in each lobe; the entire surface of the first segment is thickly set with

very minute spines. The lateral fringe of black hair begins near the posterior margin of the second segment and extends to the posterior margin of the eighth segment. The arrangement of gills is diagrammatically shown in Fig. 4. A slight variation of gills occurs on the caudal segments of different individuals.

Pupa.—Length 30 mm., breadth 6 mm. The labrum is longer than broad, extending shelf-like over the mandibles and bearing a group of five long, dark colored, hooked setæ on each lobe and two similar setæ, but not hooked, on each side near its base, a shorter seta of lighter color points forward from the cephalic margin of each lobe and a similar seta occurs laterad from each pair of long basal setæ; the mandibles are straight, without teeth and sharply pointed, reaching not quite to the extreme of the labrum, each bears two setæ near its base: the dorsal part of the first abdominal segment is marked with small cross folds, which give it a striate appearance, and is bordered behind with wing-shaped marks, somewhat striate and bearing numerous small thorns on their caudal margin, the lateral fringe is black, commencing near the caudal margin of the fifth abdominal segment and forming a loop beneath the caudal margin of the eighth segment. The antennæ reach to the caudal margin of the sixth segment. The spines on the chitinous plates are serially shown in Fig. 5, but their number and arrangement is subject to variation in different individuals.

EXPLANATION OF PLATE VI.

- Fig. 1. Larval case of *Astenophylax argus*.
- Fig. 2. Wings of male.
- Fig. 3. Larva, head and part of thorax, dorsum.
- Fig. 4. Diagram of gill arrangement on left side of abdomen.
- Fig. 5. Pupa, chitinous abdominal plates.
- Fig. 6. Male genitalia, lateral view.
- Fig. 7. Larva, labrum.
- Fig. 8. Larva, frons.
- Fig. 9. Larva, maxilla and labrum, in part, ventral.